LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155

REMARKS

The Office Action of December 19, 2001 has been carefully considered.

The drawing has been objected to as not showing the "arc of contact." The figure has now been amended to show the arc of contact "d" which is described on page 9, lines 12-14 of the specification. No new matter has been added.

Claims 1-4 have been rejected under 35 USC 112, 2nd paragraph. The claims have now been rewritten as new claims 20-31 in proper form, and withdrawal of this rejection is requested.

It is noted that claims 20-31 incorporate parameters of the as-cast strip, in particular $R_{0.2}$ x A, $R_{0.2,}$ A, and earing ratio, from original product claims 5-12.

Claims 1-4 have been rejected under 35 USC 103 over Papich et al.

Claims 1 and 2 have now been rewritten as new Claim 20, which is directed to a method for producing aluminum alloy strip of thickness between 1 and 5 mm. According to this method, an aluminum alloy is cast which consists essentially of at least one element selected from the group consisting of 0.1 to 1.5% Fe and 0.35 to 1.9% Mn, wherein Fe + Mn is < 2.5. The alloy is cast to a thickness of 1 to 5 mm between cylinders comprising a tubular shell shrink-fitted to a

cylinder body including cooling means for cooling the shell, and optionally cold rolling the cast alloy. The force applied between the rolls, expressed in tons per meter of width, is less than 300 + 2000/e where e is strip thickness expressed in mm, and the heat exchange between the alloy being cast and the shells is reduced such that shell temperature is > 80°C. Further, as defined in original Claim 5 of the application, the strip has, in an as-cast state, a product $R_{0.2}$ x A greater than 2500.

The Papich et al reference discloses a method for forming a composite metallurgical product including a roll cast aluminum alloy core and a filler material bonded onto the core. The core material may be an aluminum alloy of the 3000 series, among others, having ranges which overlap with the ranges of the claimed invention. The ultimate object of Papich et al is to form a clad strip, and as shown in Figures 11a through 11h of Papich et al, the cladding step may be performed at the casting rolls, or downstream of the casting rolls. As disclosed at column 10, lines 11 through 13, the force applied by the casting rolls is in the range of 1 to 900 tons/side, or 200 to 1800 tons across the width of the strip. This compares with the range of 700 to 2300 tons across the width of the strip according to the claimed invention, where the strip width is between 1 and 5 mm.

LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155

The Office action takes the position that during casting, the shell temperature will reach a temperature much greater than 80°C because of contact with the molten or semi-molten aluminum alloy, or alternatively, that a simple difference in structure of the apparatus cannot be considered to be a patentable limitation of process steps.

It is further alleged that an arc of contact less than 60 mm is within the disclosure of Papich et al because Papich et al teaches increasing the setback to increase hot working.

As regards the shell temperature, Applicants note that it is the practice in the art to utilize high conductivity materials for the shell in twin roll casting. For example, U.S. Patent No. 5,010,948 discloses the use of copper sleeves for the periphery of the rolls (column 1, lines 19-21), and U.S. Patent No. 5,948,354 discloses that the steel for the continuous casting ferrule should possess "good heat-exchange capacity with liquid aluminum" at column 1, lines 44-46. Copies of these references are enclosed.

As to the inevitability of shell temperatures greater than 80°C, reference is made to Example 2 on pages 13 and 14 of the present specification where strips are cast at temperatures of 70°C and 130°C; clearly, it is possible to cast using lower shell temperatures than 80°C. In the case of the higher casting temperatures, it was found that elongation

LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155

(A%) is increased, with no detriment to mechanical resistance. This is shown in Table III, where $R_{0.2}$ X A is greater than 2500 for examples according to the invention. Thus, a clear and unexpected advantage is shown in the higher casting temperatures.

As to the arc of contact, reference is made to Example 3 on pages 14 and 15 of the present specification. It can be seen from Table IV, that for each arc of contact greater than 60 mm, there is a substantial increase in earing ratio, with earing ratio in each case being greater 7. There is thus a clear and unexpected advantage to maintaining an arc of contact below 60 mm.

Table IV also shows that there is a clear and unexpected advantage to maintaining a force of less than 300 + 2000/e t/m. In each case where the force exceeds the claimed limit, the earing ratio is greater than 7, even where the arc of contact is less than 60 mm. Thus, the claimed limits have been found to be critical to obtain strip of the desired quality.

Accordingly, while the Papich et al reference may suggest varying the force between the rolls and the arc of contact, there is no disclosure or suggestion in Papich et al of the presently claimed critical limitations for obtaining a product of a desired quality. Withdrawal of this rejection is

LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155

accordingly requested.

Claim 4 has been rejected under 35 USC 103 over Papich et al in view of Jin.

Jin has been cited for its teaching at column 2, lines 25 through 37 that a setback greater than 20 mm is advantageous in twin roll casting in order to help prevent sticking of metal to rollers. However, there is no disclosure or suggestion in the combination of Jin with Papich et al that maintaining an arc of contact less than 60 mm results in a product of improved quality, as shown in Table IV, and as noted above. Withdrawal of this rejection is accordingly requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,

Ira J. Schultz
Registration No. 28666

LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155

APPENDIX

IN THE SPECIFICATION:

Page 1, above line 1, [Technical field] Field of the invention;

line 9, [State of the] Description of related art.

Page 5, line 29, [Purpose] Summary of the invention.

Page 6, delete line 13.

Page 7, line 19 [Description] Detailed description of the invention.

LAW OFFICES
DENNISON, SCHULTZ & DOUGHERTY
612 CRYSTAL SQUARE 4
1745 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VIRGINIA 22202-3417
703 412-1155